

# **GMD 5 Model**

## **Technical Advisory Committee Minutes**

**February 17th, 2009**

**Attendees:** USFWS: Don Anderson, Dan Severson, Megan Estep, and Rachel Laubhan; Balleau Groundwater, Inc.: Peter Balleau and Steve Silver; KWO: Diane Coe; SSPA: Alex Spiliotopoulos; KDA-DWR: Jeff Lanterman, Tina Alder, Darci Paull, Lisa Allen and Andrew Lyon.

The pdf file of the presentation used during this meeting can be found at <ftp://72.32.148.161>, log in with the user name “gmd5model”, and the password “Partners”.

The meeting began with introductions and remarks by Peter about the well hydrographs that were to be presented. He talked about how about 1/3 of the well and stream gage hydrographs had closely matched observed and simulated levels, 1/3 were O.K., and 1/3 were pretty far off.

Steve Silver then took over and began to talk about using the Streamflow-Routing Package (SFR) to represent Quivira, Cheyenne Bottoms, and the Dundee Diversion. At this point all are functional in the model. Quivira has eight different impoundments and Cheyenne Bottoms has 5 impoundments. A water balance was shown for Quivira and Cheyenne Bottoms and it was stated that the SFR package takes care of the recharge and evapotranspiration from these wetland areas. It was also stated that the Dundee Diversion operation schedule was pulled directly from the Mid Ark Model.

Delineation of the different impoundment pools allows for water level elevations to be properly simulated over time. Megan asked about the source and accuracy of information on water level elevation in the pools. Peter stated that it was a USGS report (Jian, X., 1998, Simulation of Canal and Control-Pond Operation at the Quivira National Wildlife Refuge, South-Central Kansas: U.S. Geological Survey Water-Resources Investigations Report 97-4289), but that if more accurate water levels were available, they would be used. USFWS will check into what data they may have and will share their findings with the committee.

The formulation of pumping stress was discussed next. It is important to start in creating a database of water level observations versus simulated water levels. The data that was presented started in 1940, and the metered data is from 1991 to 2007. All points of diversion were shown and return flow was discussed. Return flow will be applied to points of diversion and place of use.

Layer Geometry was shown and it was briefly discussed how the multi-well node package will help determine how each layer behaves as pumping occurs.

Temporal pumping distribution was discussed, with the fraction of total pumping per month during the irrigation season determined by county and crop acres using NRCS engineering handbook values.

LANDSAT images were shown and discussed. BGW has imagery archives back to 1973. 1973 to 1983 imagery has 79 meter resolution, and 1984 to present imagery has 30 meter resolution. These images are used by breaking down the calculated vegetation index (SAVI or EVI) into classes. In the current form, vegetation is classified into one of eight classes but is displayed as four classes. The metered water use data is overlain on the LANDSAT imagery, and is compared to the vegetation's water demand, which is calculated with the Hargreaves Equation of potential evapotranspiration rate, the precipitation and the plant vigor index (SAVI or EVI).

This projected crop irrigation requirement is done for each 160 acre parcel where irrigation takes place. Water use can be projected back before metering was implemented by comparisons with vegetation conditions from metered and unmetered periods.

Hydraulic properties were shown and it was discussed how they were adopted from the previous Mid Ark and Rattlesnake Creek Models.

Remnants of paleo-channels and their effect on hydraulic conductivities were shown. It was discussed that these areas would need to be included as they can have a significant effect on water movement within the aquifer.

Runoff that infiltrates into the ground and becomes recharge was shown on a monthly basis versus the amount of precipitation that is required to obtain that amount of recharge.

The model water budget was shown and it was discussed how the model performs better with the inclusion of the permeability zones.

Hydrographs of observed versus simulated water levels were shown. It was stated that model calibration will be very important as it will help get more accurate starting heads. Hydrographs for each stream gaging station were shown, and it was discussed how the next step is to get the observed versus simulated stream flows to more closely match each other.

The next steps will be to continue with a coarse calibration that improves baseflow and starting heads. Projected pumping for earlier periods is also something that needs work and attention in the near future.

Following the meeting DWR received questions via email from the Kansas Geological Survey, which were forwarded to the TAC. In addition, Steve Larson sent Balleau questions as well which were in return forwarded to the TAC as well. Balleau has responded to these questions.

A tentative date and time of April 7<sup>th</sup>, 2009 at 9:30 a.m. Central Standard Time was proposed for the next meeting. If anyone has conflicts with this time, please let DWR know.

*Action Items:*

1. USFWS will research their records on water level elevations for Quivira and Cheyenne Bottoms and transmit to the committee.
2. DWR will continue to review model files and provide any comments to BGW, and document those comments for the committee to review.